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ENTOMOLOGICAL NEWS

VOL. LX OCTOBER, 1949 No. 8

Studies on the Silphidae. I. Secondary Sexual Differences in the Genus Nicrophorus (Coleoptera)

By RAYMOND Q. BLISS, Philadelphia, Pa.

Secondary sexual characters have been described in the genus *Nicrophorus* by Horn (1), Portevin (2), and Arnett (3), but there is some lack of agreement among these authors as to the characters included and as to the reliability of each character when used to diagnose the sex of an individual. My own recent studies have led me to conclude that there are no secondary sexual characters valid for the whole genus, although some species may show them.

The above authors agree that the form of the anterior tarsi is a good character to separate the sexes. Horn states, "Tarsi slender, the anterior dilated in the male and fimbriate at the sides." Arnett states, ". . . the males have . . . the fore tarsal pulvilli expanded, whereas in the females . . . the fore tarsal pulvilli are simple." Portevin says, of the tribe Nicrophorini, page 178, "Les tarses sont de 5 articles, les quatre premiers larges chez le ♂, aux tarses antérieurs," and on page 187, of his genus *Necrocharis*, "Celui-ci [males] a les tarses antérieurs faiblement dilatés," and on page 191, of the genus *Nicrophorus s. s.*, "Les tarses antérieurs sont dilatés chez le ♂ sur les quatre premiers articles, parfois si faiblement qu'ils ne diffèrent guère de ceux de la ♀." This last statement seems to contradict somewhat the first.

The shape of the area of the head behind the eyes is used by Portevin who says, page 175, "Tête ovale, parfois subtriangu-

laire ou carrée en arrière, chez le ♂, à cause du développement des tempes," and on page 186, *Necrocharis,* "Tête ovale, brusquement étranglée derrière les yeux; . . . ," apparently without regard to sex, and on page 188, of the genus *Nicrophorus s. s.* "Tête grosse, ovale, ♀, subtriangulaire, ♂, avec les tempes, très renflées dans ce dernier sexe, ..." Arnett says, "the males have the eyes situated well forward on the head, . . . in the females the eyes are placed well towards the back of the head, ..." Horn, however, says, "The head exhibits some variation in form within specific limits; that is, while the eyes in some individuals are very close to the hind angles of the head, in others the head is notably prolonged behind them. This is neither sexual nor specific."

The clypeus and rhinarium are also used: Portevin says, page 176, "La pièce clypéal, généralement campanuliforme chez le ♂, est presque toujours de la même couleur dans les deux sexes, mais elle varie de forme et d'étendue avec la taille des individus; elle est toujours plus ou moins réduite chez la ♀," and on page 188, "L'épistome est séparé du front par une ligne tantôt droit, tantôt angulée; la pièce membraneuse qu'il renferme est généralement plus développée chez le ♂; où elle affecte la form campanulée; elle s'étend alors presque toujours jusqu'à la suture clypéo-frontale. Chez la ♀ elle a souvent une forme triangulaire, passant au trapèze tres transverse, pour aboutir à une simple bordure étroite à la partie antérieure du clypeus; elle est parfois si petite qu'on peut la considerer comme nulle. Sa couleur est constante dans la même espèce mais varie quelquefois avec le sexe." Arnett says, ". . . the ♂♂ have . . . the clypeus large . . . in the ♀ the clypeus is appreciably smaller. . . ." Horn also states that the rhinarium varies in size and shape but gives it no sexual significance. He does not give any difference in the clypeus.

Portevin states that the tooth on the posterior trochanter is always more developed in the male but varies with the size of the individual. He also says that the frontal lines of the head are more often less noticeable in back in the male and equally well marked from one end to the other in the female. He sums up as follows: "Les tarses antérieurs sont dilatés chez le ♂ sur les quatre premiers articles, parfois si faiblement qu'ils ne dif-

fèrent guère de ceux de la ♀. Ce sont alors les caractères tirés des trochanters, de la forme de la tête et surtout de la membrane clypéale, qui indiqueront le sexe." He mentions one or all of these characters in his remarks on each species.

In Portevin's remarks, in which he sometimes says clypeal piece and sometimes clypeal membrane, I find it difficult to decide whether he is referring to the entire clypeus or to the rhinarium. However, I found the rhinarium to be so variable individually that I believe it cannot be used at all. This seems to me to apply also to the frontal lines, and to some extent to the posttrochantinal spines.

Horn says that the posterior femora are stout in the ♂ of *N. carolinus* and *N. americanus*. I did not find this to hold good and noted that there is some variation in individuals. Horn also says that in *N. orbicollis* the posterior tibiae are much stouter in the ♂. It seems to me that there is a tendency for them to be more slender proximally and more expanded distally in the ♂ but this also does not hold for all individuals. However as these characters are only given for the particular species and in this study I am only considering the secondary sexual characters for the genus they are not included in this paper.

Recently I had the opportunity to study the material of this genus in the collection of The Reading Public Museum and Art Gallery, Reading, Pennsylvania. An attempt was made to evaluate the usefulness of these characters in determining the sexes, and to see if there are any secondary sexual characters that are possessed, in common, by all the species of this genus. This paper is the result of that study, and the remarks and conclusions are based on the above mentioned material.

The specimens were relaxed in Barber's relaxing fluid for from 24 to 48 hours and the genitalia drawn out, thus enabling the sex to be determined. They were studied under a Spencer stereo-binocular microscope using the 9 × ocular and the 1 ×, 2 ×, and 3 × objectives.

In each species those characters that seemed to be of any value in that species were studied and recorded.

The data presented below are the results of my investigations on 288 individuals belonging to 12 species.

N. carolinus (L.), 7 ♂♂ and 7 ♀♀ were studied. The frontoclypeal suture is straight or nearly so in all. One male has the temples expanded, the rest small. One male has the fore tarsi less expanded than in the other males, and one female has the fore tarsi slightly expanded. As for the posttrochantinal spine, the male mentioned above with less expanded fore tarsi has small spines and is a small specimen. Another male has these spines small. Two females have these spines larger than the other females. It seems then that the fore tarsi are a fairly good indicator of sex in this species but not infallible. They are, in both sexes, less expanded than in most species of the genus. The posttrochantinal spine is not very good and the other characters worthless.

N. americanus (Oliv.), 14 ♂♂, 21 ♀♀. Three males have the frontoclypeal suture straight or nearly so, and in one female it is slightly curved caudad. The other males have a larger clypeus and the frontoclypeal suture is curved caudad, the other females have this suture straight and a smaller clypeus. However the difference between the sexes in these two characters is slight in some individuals. The temples tend to be larger in the males but this difference is slight also. One of the males with a straight frontoclypeal suture has small temples, and three females have the temples large. The fore tarsi are expanded in both sexes. The posttrochantinal spine is the same in both sexes. There seems to be no very good secondary sexual difference in this species.

N. sayi Lap., 8 ♂♂, 3 ♀♀. The frontoclypeal suture tends to be curved caudad in the males and straight in the females. The temples are all small but tend to be smaller in the females. One male with a straight suture has very small temples. The others of each sex have these two characters more typical of their sex but the difference is slight. The fore tarsi of the males are expanded. One female has the fore tarsi slightly expanded, the other two not expanded. The posttrochantinal spine has no significance. The fore tarsi seem to be the best character but I do not like to draw conclusions from such a small number of specimens.

N. orbicollis Say, 34 ♂♂, 24 ♀♀. The frontoclypeal suture is straight or almost so in both sexes. The temples tend to be larger in the male but five males have small temples. The fore tarsi are not a good secondary sexual character as they tend to vary in both sexes, in some females they are expanded and in a few males they are slender. The posttrochantinal spine also varies with the individual. The temples seem to be the best character but are not absolutely reliable.

N. marginatus Fab., 37 ♂♂, 29 ♀♀. The frontoclypeal suture varies. The temples tend to be large in both sexes. The fore tarsi are expanded in the male and slender in the female. This held good for all the specimens. The posttrochantinal spine varies with the individual. The post tibia varies with the individual in the amount of curvature. The fore tarsi appear to be a very good criterion for determining the sexes.

N. pustulatus Herschel, 12 ♂♂, 10 ♀♀. The fore tarsi are expanded in the males and slender in the females, except one female, a large individual, has them slightly expanded. The other characters vary with the individual.

N. investigator Zett., 5 ♂♂, 6 ♀♀. The frontoclypeal suture is slightly curved caudad in the males and straight in the females. The temples of the males vary somewhat but are larger than the females. The fore tarsi are expanded in the males and slender in the females. The posttrochantinal spine varies but tends to be more prominent in the males. All the secondary sexual characters seem to be good, but I think definite conclusions should not be made on such a small amount of material.

N. nigritus Mann., 2 ♂♂, 5 ♀♀. This is too small a number for definite conclusions, but none of the characters is good insofar as shown by this material.

N. vespilloides Hbst., 6 ♂♂, 6 ♀♀. The small number precludes any conclusions, but none of the secondary sexual characters hold good.

N. tomentosus Web., 17 ♂♂, 20 ♀♀. The frontoclypeal suture is slightly curved in the males and straight in the females, the difference is slight and one male has a straight suture. The temples tend to be large and square in the males and small and

round in the females, but vary individually, and some of each are like the opposite sex. The fore tarsi are expanded in the males and slender in the females. The posttrochantinal spine varies individually. The fore tarsi seem to be the only reliable character in this species.

N. guttulus Mots., 5 ♂♂, 5 ♀♀. This is too small a number to draw conclusions. All have the frontoclypeal suture straight and the temples large. The fore tarsi are expanded in the males and slender in the females.

N. hecate Bland, 2 ♂♂, 3 ♀♀. Again the number is too small. However none of the secondary sexual characters was reliable except the fore tarsi which are expanded in the males and slender in the females.

Discussion

It seems hardly necessary to point out that it is the function of taxonomy to describe species in such a way that they may be recognized and this should apply to the sexes also. If secondary sexual differences exist they should be described, but this can only be determined from a study of a fairly large series of specimens. Differences that are found only in some species should not be given as applying to a whole genus. Characters that vary individually so that the individuals of each sex approach those of the other sex are not useful even though they do not actually intergrade. Those characters that do not vary individually, but are possessed by some individuals of each sex, even though they may predominate in one sex and be rare in the other, are of no value. To describe such characters with such qualifying words as 'generally,' 'sometimes,' or 'more or less' is confusing. Even though the statement, as qualified, is true one cannot know the number of exceptions that exist. Any rule or character used diagnostically must hold good for almost all of the individuals, certainly at least 90 per cent, and even this proportion may be too small where accurate results are desired.

My studies have convinced me that there are no secondary sexual character that are applicable to the entire genus. The fore tarsi seem to be most useful, but even this character does not hold good in some species. In those in which it does, it is

possible that if a larger number of individuals had been available for study more variation might have been shown. As to the other characters, *N. investigator* is the only one in which they hold good, but 5 ♂♂ and 6 ♀♀ cannot be used as an adequate sample of a species. The shape of the temples is almost always either definitely rounded or square without intergrades but cannot be correlated with the sex in many individuals. The fronto-clypeal suture varies individually and intergrades, and so does the rhinarium. The posttrochantinal spine intergrades between the individuals of each sex in each species. It does seem to show specific differences in some species but that is apart from the subject of this paper. Many of the individuals show a strong tendency to have the characters that have been said to pertain to the opposite sex. This is more true of some species than of others, and especially the smaller males of each species approach the female and the larger females approach the male in the characters studied. Some individuals resemble the opposite sex in only one of these characters while others do in two or three. The use of the term "gynandromorph" in this connection is incorrect, according to modern usage, since no true sex-mosaics were encountered, i.e., no individuals in which a definitely circumscribed region, say one side, is genetically of the opposite sex.

It seems, then, that to determine the sex the genitalia must be observed. They can be drawn out after being relaxed, or caused to be extruded by the method of Valentine (4), though I have not tried the latter. Some individuals die with the genitalia sufficiently extruded to determine the sex. Also the males have what appears to be one more abdominal segment than the female.[1] This is more or less retracted into the next segment cephalad, but is frequently extruded enough to be ob-

[1] I am not concerned here with the homologies, but only with determining the sexes. However, from a rather cursory study of the literature I am inclined to the opinion that, in this genus, the first two abdominal sternites have become atrophied and that the six visible ventral abdominal sternites are really sternites 3–8 of the abdomen, and that the extra segment of the male mentioned here is the 9th. Also that in the female the ninth segment, or part of it, has participated in forming the genitalia.

served. It is composed of four sclerotized pieces, one dorsal, one ventral, the other two lateral, connected by membranes. The aedeagus when extruded comes out between the ventral and left lateral pieces, where the membrane is reduced.

I would have liked to have made a more precise and quantitative study of this subject but rather doubt that any additional practical information would have come of it. I believe I have shown that the usually used sexual differences are not very reliable, so I have cleared up this one point. A more thorough study, if undertaken, should deal with each species separately, using a large series of specimens.

My thanks are due to The Reading Public Museum and Art Gallery, Reading, Pa., and to Mr. Lawerence S. Dillon, Curator of Insects there, for loan of the material used.

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IXth International Congress of Entomology.

The IXth International Congress of Entomology will be held August 17th–24th, 1951, in Amsterdam (Netherlands). Entomologists wishing to receive, in due course, programs and application forms are requested to communicate with the Secretariate, c.o. Physiologisch Laboratorium, 136 Rapenburgerstraat, Amsterdam.

Further communications will follow in 1950.

A New Species of Microcylloepus from Nevada (Coleoptera: Dryopidae)

By Ira La Rivers, University of Nevada, Reno

HELMINÆ

Microcylloepus Hinton 1935

Microcylloepus moapus [1] sp. nov.

[2] *General:* a somewhat narrow, linear species; dorsum reddish-black, often obscured by a bluish-white powder, even in alcohol; color sometimes lightening to reddish-brown on posterior pronotum and anterior elytra. 1.7–1.9 mm. long; 0.7–0.8 mm. wide.

Head: round, compact, withdrawn beneath anterior margin of pronotum to posterior eye margins; surface minutely granulate; occiput, face (interocular space) and clypeus blackish-blue, granulate, in contrast to smooth, shiny black labrum. A thin silvery band is usually discernible across lower (ventral) end of clypeus (labro-clypeal band). Mouthparts and 11-segmented antennae yellowish; palpi white at sensory tips; antennae nearly equal to pronotal length; eyes whitish.

Pronotum: darker anteriorly (blackish, often with blue-white tinge), generally fading to reddish or yellowish brown on posterior half. Surface finely granulate; convex, and occasionally somewhat shiny anteriorly, flattened posteriorly. Lateral longitudinal carinae distinct for entire pronotal length, more or less bisinuately following outlines of lateral edges. Posterior disc bearing a readily detectable "Y"-shaped ridging, the handle of the "Y" generally more easily seen than the forks. Edges sinuate on all sides except anterior, which is smooth across front, terminating in the antero-lateral angles which are abruptly produced forward into short, blunt angles; lateral edges bisinuate, the anterior sinuosity slightly weaker and shorter than pos-

[1] From the Piute word "moapa," meaning "muddy"; the Warm Springs area in northern Clark County is the source of the Moapa River.

[2] The following description is based entirely on alcoholic material. In dried specimens, the true color pattern is badly obscured by pile and a coating of bluish-white powder.

terior; greatest pronotal width across posterior lateral sinuosities; tuberculations of lateral edges give the effect of very weak serrations under strong magnification. Postero-lateral angles weakly acute, much less spinous than antero-lateral angles. Sinuosity of posterior margin in the form of an unstrung longbow. Base- and apex-widths about equal.

Elytra: essentially unicolorous brown- to reddish-black, often lightening anteriorly. Color occasionally obscured somewhat by bluish-white powder. Surface weakly costate and coarsely punctate, punctures arranged in longitudinal series—the whole distinctly producing an appearance of roughness. Costae IV and V evident under strong power; the longest (V) originates ventrad to umbonal area and extends caudad nearly to elytral apex; Costa IV originates across top of umbonal area, curves away from, then toward, Costa V, disappearing in posterior third of elytra. Both costae are resolved into lines of closely set tubercles under high power. The tiny, rounded scutellum may be inconspicuously the same color as surrounding elytra, or may stand out weakly by virtue of being a bit lighter in color. Elytral sides straight and slightly divergent in anterior third, thence evenly rounded to apices. Humeral angles well rounded. Wings small, nonfunctional, reduced to one-third elytral length.

Venter: yellow-brown to deep reddish, nearly always blackish along prothoracic collar. Conspicuous short, white pile present, most noticeably along metasternal and abdominal edges in alcoholic material. Surface weakly granulate but not particularly roughened.

Legs: from dorsal aspect, in approximately the normal walking position (in which stance these animals characteristically die in alcohol), femora are typically blackish at apices, yellow or brown inwardly; tibiae blackish, lightening in color at both ends; tarsi yellowish. Ventrally, femora lighter proximally.

Genitalia: see fig. 1.

Type locality: NEVADA, Clark County (*Warm Springs* (Big Pool and its outlet streams), 26–27(xii)48, el. 1,700 ft., LaR.). Known only from the type locality.[3]

[3] For a more comprehensive description of the type locality, see Reference No. 3.

Types: in the author's collection; paratypes in the collections of California Academy of Sciences, U. S. National Museum, American Museum of Natural History, British Museum (Natural History) and the Paris Museum.

Microcylloepus moapus seems closest to *M. thermarum* (Darlington) 1928 (*Helmis*) described from "Hot Spring no. 15;

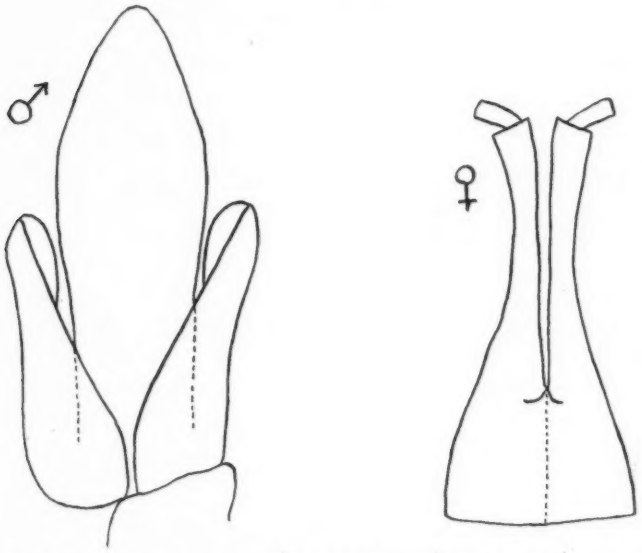

FIG. 1. Male and female genitalia of *Microcylloepus moapus* sp. nov. (holo- and allotypes, respectively).

Opal Mine 25 mi. So. Denio, Ore.," from some of Dr. C. T. Brues' material. Actually, the type locality of *M. thermarum* is some 25 miles within Nevada, since Denio is a bordertown. *M. moapus* differs from *M. thermarum* in being slightly more robust, particularly about the elytra, and in having a pronounced constriction of the pronotum near base, where pronotal sides narrow distinctly before sweeping out to form the postero-lateral angles. This is lacking in *M. thermarum*, the posterior sinuosity

curving inwardly smoothly to the postero-lateral angle without such a constriction. These two species constitute a small but distinct group among the Microcylloepi known to me by virtue of the very long and comparatively narrow pronotum. The Hintonian *M. angustus* from south-central Mexico (District of Temascaltepec) at an elevation of 5,600 feet may form a third link in this group-chain, although I can base my opinion only on Hinton's statement that *M. angustus* "most nearly resembles *M. thermarum* (Darlington) of Oregon, but may be distinguished by having the inner sublateral carinae of the elytra moderately prominent and extending to apical half, whereas in *thermarum* the inner sublateral carinae are absent or scarcely visible" (1940). I have not seen the species, but its described flightlessness is in accord with one of the group's dominant characteristics. Our species are known only from thermal waters, but no mention is made by Hinton of temperature conditions surrounding the types of *M. angustus*.

Merely as a preliminary statement, I do not anticipate at the moment that the Microcylloepi will be of primary aid in deciphering the most important of the perplexing mysteries of stream growth and pattern-change which still shroud our basic understanding of the geohydrography of the Great Basin. This statement I can apply, and then, as indicated, only preliminarily, to the thermal species known to me. Cooler waters may show a different picture, but it is possible that the unique similarities between many thermal waters in Nevada may be such as to produce little recognizable change in isolated populations of a given stock, except over very long periods of time—and of course, the longer the time-periods involved, the more it is likely that any changes would be due to gradual alterations in the thermal environment rather than merely to the element of time *per se* allowing random perfection of genetic tendencies. There is no doubt that *M. moapus* and *M. thermarum* are close, and it is quite possible that intervening forms may come to light in future and show the whole to be one intergrading series of populations. With present knowledge, however, they are distinct enough to be readily separable.

From the larger and more widespread *Microcylloepus similis* (Horn) 1870, which occurs with it, *M. moapus* may be easily differentiated by the wing characteristics. *M. similis* possesses large wings which reach at least to abdominal apices in contrast to the reduced flight stubs of *M. moapus*.

Since not enough material of *M. thermarum* is available at present for dissection, it is impossible to compare genitalia and wing conditions between the two species.

Microcylloepus moapus fraxinus subsp. nov.

Identical to the typical subspecies but more robust in form and slightly longer, a difference hardly detectable unless side-by-side comparison can be made. Lateral pronotal and elytral serrations are also slightly stronger and more marked. The most prominent distinguishing characteristic lies in the wing structure. In *M. m. moapus,* the wings are greatly reduced, never exceeding one-third the abdominal length; *M. m. fraxinus* possesses less reduced wings which reach caudad just slightly more than half the abdominal length. There are no detectable differences in genitalia.

Type locality: NEVADA, Lincoln County (Ash Springs (Pahranagat Valley), outlet streams, 28(xii)48, el. 3,750 ft., LaR.). Known only from the type locality. Ash Springs is some 55 airline miles north of Warm Springs. Both lie on the course of Pleistocene White River, but are no longer directly connected. The widespread *M. similis* seems distributed along the entire course of Pleistocene White River, being found associated with both subspecies of *M. moapus,* as well as occurring seemingly by itself at Hiko Spring, several miles north of Ash Springs.

Types: in the author's collection.

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LA RIVERS, I. In press. The meeting point of Ambrysus and Pelocoris in Nevada (Hemiptera: Naucoridae). Pan-Pac. Ent.

A New Centipede from the Eastern United States (Chilopoda: Geophilidae)

By RALPH E. CRABILL, JR., Cornell University

Although Chamberlin has described several species of *Brachygeophilus* from the western United States, the following species is the first member of the genus to be taken in the east and is therefore of particular interest.

Brachygeophilus rupestris new species

The present species bears a marked resemblance to the European species *Brachygeophilus truncorum truncorum* (Bergsö and Meinert, 1866) but may be readily distinguished from the latter by the distinct but small clypeal area on the anterior portion of the clypeus; by the four (or three) ventral coxal pores present on each ultimate leg; and by the distinctly longer than wide cephalic plate (61 : 52). In addition, this American species has a total length of 22.2 mm., whereas Brolemann reports that the maximum length of the European species is 18 mm. long.[1]

Type: ♀, Olean, Cattaraugas Co., NEW YORK. March 30, 1949. (Walter Kempf, O. F. M.; under a rock along bank of Alleghany River), in author's collection, C–393.

Female. Total length 22.2 mm. *Antennae* pale yellow throughout; absolute length (after clearing in KOH and mounting in balsam) 2.2 mm.; 3.5 times the length of the cephalic plate; 1st article short, subquadrate, wider than subsequent articles, its width to greatest width of next article is 15 : 13; articles 2, 3, 4, and 5 subrectangular; articles 6, 7, 8, and 9 roughly obconical, the rest roughly globular except the last, which is ovate, in distended condition shorter than preceding two articles (20 : 25); most proximal articles sparsely beset with long setae, the following articles becoming gradually more glabrous, these setae proportionately shorter, less strong. *Cephalic plate* yellow, same shade as antennae; longer than wide (61 : 52), widest at mid-length; lateral margins gently convex, anterior margin slightly, angularly bowed forward, the anterior corners angular,

[1] Faune de France, vol. 25, 1932, p. 181.

posterior margin slightly incurved, the posterior corners rounded; dorsal surface areolate except for a solid area on either side and a central area, delineated on all sides by areolated strips of varying width; beset dorsally with long setae, anteriorly one seta immediately behind inner corner of each first antennal article, behind these, a transverse row of seven setae, remainder of setae on the posterior four-fifths of the plate not arranged in such definite rows. *Clypeus* coarsely areolate; wider than long (5:3); clearly delineated by a pale lateral line on either side; immediately behind the anterior clypeal margin behind and between the antennal insertions a definite clypeal area present, this delicately areolate, white, and beset with three small setae arranged in a triangle, the apex posteriorly; immediately in front of and slightly lateral to the clypeal area are two post antennal setae, one at the inner basal angle of each antennal insertion; immediately behind the clypeal area and slightly lateral to it are two widely separated, small setae. *Labrum* dark brown, the three portions, taken together gently bowed forward; central portion beset with six triangular, strong teeth; length of central portion to entire labrum is 1:1.6, lateral portions each with two or three obscure, irregular pectinations on medial third. *First maxillae* as in *B. t. truncorum* with four small, weakly chitinized lappets, one on the basal outer margin of each telopodite, one on either outer corner of the syncoxite; each telopodite beset with four setae arranged lengthwise; the syncoxite distinctly areolate, the telopodites less so; telopodites slightly surpassed by syncoxal projections anteriorly. *Second maxillae* with medial syncoxal area coarsely areolate; whitish; narrower than second telopodite article (of second maxillae) (4:6); telopodite with well developed claw, first article with one or two inner setae, the second with two or three, the last with about six, these long, clear, subequal to apical claw. *Prehensors* dark yellow, same shade as rest of head, except claw which is dark brown; areolate; just short of attaining the anterior cephalic margin when closed; tarsus at claw base with slight, pointed denticle, other articles unarmed; ventral and medial surfaces of articles sparsely beset with long, brown setae. *Prosternum* same color as prehensors; areolate; chitin lines

very short, indistinct, barely separated from lateral prosternal sutures; greatest width 1.4 times greatest length.

Tergites light yellow, darkest anteriorly, shading to whitish yellow posteriorly; all tergites and basal plate bisulcate, distinctly so anteriorly, becoming less distinctly so posteriorly; first tergite broadest anteriorly, the sides converging posteriorly; last tergite wider than long (1.6:1); each tergite with two definite transverse rows of six to nine setae, one row paralleling the anterior margin, one the posterior margin; last tergite with eight very long setae, two setae arranged longitudinally on each lateral border, four setae centrally; anterior margin of last tergite straight, the posterior margin semicircular. *Stigmata* first stigma (on second pedal segment) distinctly larger than second stigma, thereafter becoming gradually smaller posteriorly. *Sternites* light yellow; areolate; the first rounded anteriorly; the second to twelfth with a central, transverse, rectangular area raised and separated from anterior and posterior steeply sloping sides by light areolate lines; the anterior sloping sides of sternites 2–10 shallowly excavate to constitute on each a carpophagus structure; sternites 2–12 with a definite, well-chitinized posterior tubercle, these fitting into the split intercalary sternites; all sternites broadly trisulcate, those bearing posterior tubercles most distinctly so, the more posterior sternites shallowly trisulcate; all sternites with two rows of transverse setae, four in each row; ultimate leg sternite trapezoidal, narrowing strongly posteriorly, posterior margin straight, twice as broad as long; terminal pores present; anterior most intercalary sternites distinctly divided medially, posterior ones less distinctly so. *Legs* 37 in number; light yellow; beset with long dark setae arranged in circular rows; claws slightly curved, dark brown; first legs subequal to second in length. Terminal claws of ultimate and penultimate legs equal in size. Ultimate legs beset with long sparse setae. *Ultimate leg coxae* each with four large, ventral pores (the left coxa with a fifth small outer one), arranged in a longitudinal row of three with the fourth, the largest, on the immediate medial side of the second outer pore.

Allotype: ♂, Clifton Forge, Alleghany Co., VIRGINIA, March 6, 1949 (Richard L. Hoffman), in author's collection, C–394.

Male. Total length 7 mm. Essentially the same as the female type but differing in the following characters: *Clypeal area* distinct but containing only two setae, instead of three. *Post clypeal areal setae* just behind clypeal area but not as widely separated as in the type. *Ultimate leg coxal pores* with same arrangement as in the type but only three in number, the outer medial pore not present. *Ultimate legs* as in type beset with long setae, but legs are distinctly more crassate than those of female type. Pairs of legs 39.

Paratype: ♀, Clifton Forge, Alleghany Co., VIRGINIA, March 6, 1949 (Richard L. Hoffman), in author's collection, C–395.

Female. Total length 9 mm. Agrees with the type and with the allotype in bearing a distinct clypeal area and in having the cephalic plate distinctly longer than wide (61 : 53). Agrees with the allotype in having but two setae within the clypeal area and in having the post clypeal areal setae closer together. *Ultimate leg coxae* each with three pores, the fourth medial pore not present. Pairs of legs 39.

Remarks: All measurements of the various portions of the cephalic plate were made after it had been mounted in balsam. In balsam the clypeal area, though still evident, tends to become less distinct, so that it is best seen unmounted. The slight variations in setal arrangement and ultimate leg coxal pore number evidenced in the allotype and paratype from Virginia are probably due to their immaturity, which is evident from their lengths, 7 and 9 mm. as opposed to the length of the type, 22.2 mm.

Current Entomological Literature

COMPILED BY RAYMOND Q. BLISS AND R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1949 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S). Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Barendrecht, G. and G. Kruseman—Prof. Dr. J. C. H. de Meijere, 1 April 1866–6 November 1947. (Obituary and bibliography, with portrait.) [Tijdschr. voor Ent.] 1949: 1–15. **Beebe, W.**—Insect migration at Rancho Grande in north-central Venezuela. General account. [95] 34 (12): 107–10, ill. **Cazier, M. A. and A. L. Bacon**—Introduction to quantitative systematics. [Bull. Amer. Mus. Nat. Hist.] 93: 349–88. **Elton, C.**—Population interspersion, an essay on animal community-pattern. [Jour. Ecol., London] 37: 1–23. **Greenberg, J.**—A method for artificially feeding mosquitoes. [Mosq. News] 9: 48–50, ill. **Hatch, M. H.**—Studies on the fauna of Pacific Northwest greenhouses (Isopoda, Coleoptera, Dermaptera, Orthoptera, Gastropoda). [45] 57: 141–65. **Hoffmann, C. H. and J. P. Linduska**—Some considerations of the biological effects of DDT. [81] 69: 104–14, ill. **Krumbiegel, I.**—Zur Rassenanalyse und systematischer Subtilforschung nach Untersuchung an Carabiden. [Ent. Blätter, Biol. Syst. Käfer] 41–45: 7–25. **Lüscher, M.**—Neue Methode zur Zucht und Beobachtung von Termiten im Laboratorium. [Rev. Suisse Zool.] 56: 269–71, ill. **Macfadyen, A.**—Population ecology. [Science Progress] 37: 532–43. **Townes, H.**—The effectiveness of DDT against dermestids in insect boxes. [65] 51: 165–68. **Wautier, J.**—Procédé graphique d'expression de l'évolution des biotypes et de la dynamique des biocoenoses. [Bull. Biol. Fr. Belg.] 83: 189–205.

ANATOMY, PHYSIOLOGY, MEDICAL—Balazuc, J.—Sur une mutation homéotique de Drosophila melanogaster et sa signification. [Rev. France Ent.] 16: 77–81. **Banks, C. J.**—The absorption of water by the eggs of Corixa punctata (Corix.) under experimental conditions. [40] 26: 131–36. **Beadle, L. C. and S. F. Beadle**—Carbon dioxide narcosis. [53] 164: 235. **Bonnemaison, L.**—Sur l'existence d'un facteur inhibant l'apparition des formes sexuées chez les Aphidinae. [C. R. Acad. Sci., Paris] 229: 386–88. **Buck and Keister**—Respiration and water loss in the adult blowfly, Phormia regina, and their relation to the physiological action of DDT. [12] 97: 64–81. **Cousin, G.**—La variété macroptère de Gryllus campestris. Elements biométriques de sa determination. [Bull. Soc. Zool. France] 72: 137–43,

1947. **Dupuis, C.**—Observations biologiques sur les parasites d'Hémiptères Hétéroptères à Richelieu (Indre-et-Loire) en 1946, 1947, 1948. [Annales de Parasit.] 24: 211–42. **Fischer-Piette, E. et P. H. Fischer**—Remarques sur le vol du point fixe ou vol stationnaire des Dipteres. [Bull. Biol. Fr. Belg.] 83: 206–09. **Fish, W. A.**—Embryology of Phaenicia sericata (Calliphor.). Part III. The gastrular tube. [5] 42: 121–33. **Ganapati, S. V.**—On the structure and post-embryonic development of the male genital organs of the wooly bear, Anthrenus fasciatus (Dermestidae). [Jour. Zool. Soc. India] 1: 49–56. **Gloor, H.**—Biochemische Untersuchungen am Letalfactor "Letal-translucida" (ltr) von Drosophila melanogaster. [Rev. Suisse Zool.] 56: 281–85. **Goldstein, L.**—Contribution à l'étude de la sensibilité héréditaire au gaz carbonique chez la Drosophile. Mise en évidence d'une forme nouvelle du génoïde. [Bull. Biol. Fr. Belg.] 83: 177–87. **Hadorn, E.**—Zur Entwicklungsphysiologie der Mutante "lethal-translucida" (ltr) von Drosophila melanogaster. [Rev. Suisse Zool.] 56: 271–80, ill. **Hawley, I. M.**—The effect of summer rainfall on Japanese beetle populations. [45] 57: 167–76. **Heikertinger, F.**—Das Problem der "Totalzeichnung" auf dem Schmetterlingsflügeln. [Zeitschr. Wiener Ent. Ges.] 60: 85–89. **Henseler, C.**—Die Flügeldeckenfärbung der Carabiden. [Ent. Blätter, Biol. Syst. Käfer] 41–45: 82–87. **Homann, H.**—Blutdruck und Häuting bei Spinnen. [Die Naturwissenschaften] 36: 21–24, ill. **House, H. L.**—Nutritional studies in Blattella germanica reared under aseptic conditions. III. Five essential amino acids. [23] 81: 133–39. **Hudson, G. B.**—Studies on the comparative anatomy and systematic importance of hexapod tentorium. III. Odonata and Plecoptera. [Jour. Ent. Soc. Southern Africa] 11: 38–49, ill., 1948. **Kaestner, A.**—Über der Farbsinn der Spinnen. [Die Naturwiss.] 36: 58–59. **Kästner, A.**—Zur Entwicklungsgeschichte von Thelyphonus caudatus L. (Pedipalpi). 2 Teil. [Zool. Jahrb. (Anat.)] 70: 169–97. **Lorković, Z.** Chromosomenzahlen-vervielfachung bei Schmetterlingen und ein neuer Fall fünfacher Zahl. [Rev. Suisse Zool.] 56: 243–50. **Merrell, D. J.**—Selective mating in Drosophila melanogaster. [Genetics] 34: 370–89. **Munson and Yeager**—Blood volume and chloride normality in roaches (Periplaneta americana) injected with sodium chloride solutions. [5] 42: 165–73. **Newcombe, C. L.**—An application of the allometry equation to the study of growth in Callinectes sapidus (Crustacea). [3] 82: 315–25. **Noland, Lilly and Baumann**—Vitamin re-

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Comparative biology of salticid spiders at Rancho Grande, Venezuela. Pt. III. Systematics and behavior in representative new species. [95] 34 (7): 31–52, ill. **Hartman, A. G.**—A new species of Nanhermannia with notes on the genus (Acarina Nanhermanni). [65] 51: 169–71. **Hatch, M. H.**—(Isopoda, see under General.) **Homann, H.**—Araneae. (See under Anatomy.) **Kaestner, A.**—Araneae. (See under Anatomy.) **Kästner, A.**—(See under Anatomy.) **Schulze und Schröder**—(See under Anatomy.)

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ORTHOPTERA—Cousin, C.—(See under Anatomy.) **Hatch, M. H.**—(See under General.) **House, H. L.**—(See under Anatomy.) **Liebermann, J.**—Segundo informe sobre area permanent de Schistocerca cancellata en Chile. [An. Soc. Cien. Arg.] 147: 212–30. **Munson and Yeager**—(See under Anatomy.) **Noland, Lilly, and Baumann**—(See under Anatomy.) **Shutts, J. H.**—(See under Anatomy.) **Slifer, E. A.**—(See under Anatomy.)

HEMIPTERA—Banks, C. J.—(See under Anatomy.) **Bonnemaison, L.**—(See under Anatomy.) **Caldwell, J. S.**—A generic revision of the treehoppers of the tribe Ceresini in America north of Mexico. [71] 98 (3234): 491–521, ill. **Carvalho, J. C. M.**—Mirideos neotropicais—36: Gênero Chiloxionatus Reuter, com descrições de quatro espécies novas. [Anais Acad. Brasileira Cien.] 21: 139–50, ill. **DeLong and**

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Reviews

THE WAYS OF A MUD DAUBER. By George D. Shafer. Stanford University Press, Stanford, California. 1949. Pp. xiii + 78. Price $2.50.

This attractive little book makes fascinating and easy reading. The result of five years of patient study and experimentation by a retired professor of physiology, it is dedicated to "Crumple-Wing," a perfect female of the large species *Sceliphron cementarium*, perfect except that one wing failed to expand fully so that she could not fly. "Crumple-Wing" therefore had to be attended by the author. In this task much was learned that had not been known before, how the mother mud dauber, herself, feeds on the vital body fluids of spiders as well as stocking her cells with their paralyzed bodies for her offspring.

Mud daubers are shown to have personality, to differ from each other in their reactions. By patient efforts they may be conditioned so that they will feed on honey placed on one's finger. Life histories of mud daubers are given and these are illustrated by plates of photographs including kodachrome reproductions of the wasps and spiders in addition to very helpful figures in the text.

Much attention is given to the white pellets seen in the "fat body" of the overwintering larva and to those passed from the rectum of the adult into the cocoon before emergence. These are largely made up of uric acid, highly insoluble in water. How, then, is this waste product so quickly transferred from the tissues where it is stored to the rectum whence it may be voided? It is shown that by means of the enzyme uricase the "uric acid to allantoin" reaction takes place in the body. This soluble allantoin, as also some uricase, is excreted by the Malpighian tubules into the rectum. Then, with the reabsorption of excess water, the allantoin in the rectum becomes highly concentrated, resulting in a reverse reaction, "allantoin to uric acid," which is also initiated and maintained by the uricase. Thus the pellets reappear where they may be voided. "What man, afflicted with gout, would not envy the mud dauber her ability to eliminate uric acid when she is ready to emerge from her cell?"—P. W. WHITING.

THE INSECT WORLD OF J. HENRI FABRE, with Introduction and Interpretive Comments by Edwin Way Teale. Dodd, Mead and Co., New York. 1949. Pp. xvi + 333. Price $3.50.

Hitherto available in English, when not out of print, only in the form of a number of separate books, this new edition of Fabre makes it possible for everyone to possess the best parts of the famous *Souvenirs Entomologiques* bound in one convenient volume and at a very modest price.

No other writer on insects has been so widely read and acclaimed as has this author. Fabre was a penetrating observer who described and interpreted what he saw with such enthusiasm and in such fine literary language that the doings of the insects come to stand out very vividly in the mind of the reader.

Mr. Teal's short introduction provides a concise account of Fabre's life and struggles, and of his work and its significance to naturalists and to students of insect behavior. Each of the 40 chapters is introduced by a few lines of explanation and there is an index at the back of the book.—R. G. SCHMIEDER.

THE MODE OF ACTION OF ORGANIC INSECTICIDES. By Robert L. Metcalf. Chemical-Biological Coordination Center, National Research Council, Washington, D. C. Pp. 84. 1948.

This review was prepared under the auspices of the Entomology subcommittee of the above Coordination Center. Dr. Roger B. Friend, of the Connecticut Agricultural Station, is the chairman. The substances treated of are: nicotine, pyrethrum, rotenone, organic thiocyanates, dinitrophenols, phenothyazine, DDT, benzene hexachloride and organic phosphates. In respect to each of these substances a concise account is given of the information gleaned from the literature on: its toxicology, method of gaining entrance to the body of the insect, the physiology of its action (i.e., upon what tissues or organs it acts and the mode of action), and some other matters of biochemical interest that were available. The information recorded is in all cases credited to the original sources, which are listed in the 300 selected references at the end of the book.

To workers in this field, this little book will, no doubt, be a great convenience. To the non-adept, it will at least provide some acquaintance with the difficulty and intricacy of the problems involved and yield some insight into the type of work presently occupying insect physiologists and toxicologists.—R. G. SCHMIEDER.

Entomon, a new Journal.

Entomon. Internationale Zeitschrift für die gesammte Insektenkunde. The extended title includes also: "vereinigt mit Zentralblatt für das Gesammtgebiet der Entomologie, Klagenfurt." This journal has appeared monthly since January 1949. The size is 6½ x 9 inches, and each number consists of 24 pages of text, double column, and using small type, ca. 8 point. It is published in Munich by Dr. Herbert Brandt and Hermann Bollow, and there are listed on the masthead as contributors 17 outstanding entomologists, mostly European. It is planned to publish on all aspects of the science and to interest all kinds of entomologists with a view of offsetting the effects of too narrow specialization.

In the first issue there is an article, by Hans Sachtleben, Director of the deutsches entomologisches Institut, on the problems of bibliography. This institute is planning to bring the bibliographic works of Hagen and of Horn and Schenkling up to date; these older works include 25,229 titles up to 1863. W. Horn estimated that about 300,000 titles have appeared between 1863 and 1925. Since 1925 there have been annual increments of about 5000, and the total number of titles since 1864 must be around 400,000, of which almost three-quarters (280,000) have been accumulated in the card files of the Institute. The Institute solicits the aid of all entomologists and institutions in completing this work and in checking the cards to make corrections and additions to the parts dealing with their own publications. Published, this index, since 1864, would occupy 20 volumes of 1000 pages each. The Horn and Schenkling "Index," unlike the Hagen work, is still without a subject index, a lack that may be remedied as a result of work now well under way by the coleopterist Dr. Carl Fiedler. Dr. Fiedler, now 85 years of age, is known, among other things, for his papers on American Cryptorrhynchidae.

Also in this first issue are: an account, with seven small maps, of the spread of the San Jose scale over the face of the earth, a description of the external anatomy of the Narcissus fly Lampetia, as well as special departments for International Nomenclature, Entomological Technic, Short Notes and Reviews. The other early issues have the same make-up and in each there are articles of general interest as well as specialized systematic papers. There are articles on stridulation in grasshoppers, butterfly migrations, quantitative zoogeography, and there is one giving new data on the amazing mating blights of male bumble bees. These males, it appears, cover a 300 meter circuit with its many regular stopping places about 20 times per hour all day long! Lazy drones?

In addition to the regular numbers, supplemental numbers are planned. The price is DM 1.50 per month plus postage. Single copies, DM 2.00.—R. G. S.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Lepidoptera—Large quantities of Plexippus, Colias, Cardui, Vanillae wanted for cash or exchange for tropical butterflies. G. MacBean, 710 Miller Rd., Sea Island, Vancouver, B. C.

Ants of the tribe Dacetini (*Strumigenys, Rhopalothrix* and related genera) wanted for world revision. W. L. Brown, Jr., Harvard University Biological Laboratories, Cambridge 38, Mass.

Mallophaga (on which immediate determination is not necessary) wanted for study and determination. R. L. Edwards, Dept. Biology, Harvard University, Cambridge 38, Mass.

Tingidae (Heteroptera) of the world wanted, in alcohol, with host and other ecological data. Will collect other orders in exchange. N. S. Bailey, 16 Neponset Ave., Hyde Park 36, Mass.

Bombidae, nearctic and neotropical, wanted for exchange, identification, or purchase. Will exchange in other groups for bumblebees. Barth Maina, Dept. Zool., Univ. of Chicago, Chicago 37, Ill.

Saturnidae of the world. Will purchase individual specimens or cocoons. F. E. Rutkowski, St. Bede College, Peru, Illinois, U. S. A.

Butterflies of New England, principally from New Haven, Conn., for exchange. Louis Clarke, 28 W. Elm St., New Haven 15, Conn.

Wanted—Proc. Ent. Soc. Phila., vols. 1-6; Proc. Cal. Acad. (Nat.) Sci., 1-7; Proc. Acad. Nat. Sci. Phila., 1-20; Trans. Amer. Ent. Soc., 1-10; Bull. Buff. Soc. Nat. Sci., 1-5; Psyche, 11, 13, 15; Ent. Amer. n.s., 7-26. C. F. dos Passos, Mendham, N. J.

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